

What is claimed is:

- 1 1. A communication device for use in a wireless communication system  
2 comprising:  
3 a receiver front end to receive a communication signal from a wireless channel;  
4 a noise classification unit to determine a present noise classification for the  
5 wireless channel based on the received communication signal;  
6 an adjustable noise flattening filter to filter the communication signal received  
7 from the wireless channel to generate a filtered signal, said adjustable noise flattening  
8 filter having a filter response that is responsive to the noise classification determined  
9 by the noise classification unit; and  
10 an equalizer to process the filtered signal generated by the adjustable noise  
11 flattening filter.
- 1 2. The communication device of claim 1, comprising:  
2 a noise estimation unit to determine a noise estimate for the wireless channel  
3 using the received communication signal, wherein said noise classification unit uses  
4 said noise estimate to determine said present noise classification.
- 1 3. The communication device of claim 2, comprising:  
2 a channel estimation unit to determine an estimated channel response of the  
3 wireless channel using the received communication signal, wherein said noise  
4 estimation unit uses the estimated channel response to determine said noise estimate.
- 1 4. The communication device of claim 1, wherein:  
2 said adjustable noise flattening filter includes a plurality of individual filters that  
3 each have a different filter response.
- 1 5. The communication device of claim 4, wherein:  
2 said plurality of individual filters each correspond to a different noise  
3 classification.

1 6. The communication device of claim 4, wherein:  
 2 said adjustable noise flattening filter includes an input for receiving a signal to  
 3 be filtered, an output for outputting a filtered signal, and a switch for selectively  
 4 switching one of said plurality of individual filters into a flow path between said input  
 5 and said output in response to the noise classification determined by the noise  
 6 classification unit.

1 7. The communication device of claim 1, wherein:  
 2 said adjustable noise flattening filter includes a single filter having a modifiable  
 3 filter response.

1 8. A communication device comprising:  
 2 means for receiving a communication signal from a wireless communication  
 3 channel;  
 4 means for estimating a noise spectrum within the wireless communication  
 5 channel using the communication signal;  
 6 means for selecting a noise flattening filter response based on said noise  
 7 spectrum estimated by said means for estimating; and  
 8 means for filtering the communication signal using the filter response selected  
 9 by said means for selecting.

1 9. The communication device of claim 8, wherein:  
 2 said means for estimating a noise spectrum uses an estimated channel response  
 3 to estimate said noise spectrum.

1 10. The communication device of claim 8, wherein:  
 2 said means for filtering includes a bank of individual filters and a switch for  
 3 directing said communication signal to one of said individual filters based on a control  
 4 signal.

1 11. The communication device of claim 8, wherein:  
2 said means for selecting a noise flattening filter response includes means for  
3 calculating filtered noise powers using said noise spectrum estimated by said means for  
4 estimating.

1 12. The communication device of claim 8, wherein:  
2 said means for selecting a noise flattening filter response includes means for  
3 selecting one of a finite number of predetermined filter responses based on said noise  
4 spectrum estimated by said means for estimating.

1 13. A method for processing a communication signal comprising:  
2 receiving a communication signal from a wireless channel;  
3 estimating a noise spectrum within said wireless channel using said  
4 communication signal;  
5 selecting one of a plurality of filter responses to filter said communication  
6 signal based on said estimated noise spectrum; and  
7 filtering said communication signal using said selected filter response to  
8 generate a filtered communication signal having a noise component that is flatter than  
9 a noise component of said communication signal.

1 14. The method of claim 13, wherein:  
2 estimating a noise spectrum includes:  
3 convolving an estimated channel response with data known to be within  
4 said communication signal to generate an estimated signal; and  
5 subtracting said estimated signal from the received communication  
6 signal to generate said estimated noise spectrum.

1 15. The method of claim 13, wherein:  
2 selecting one of a plurality of filter responses includes:  
3 analyzing said estimated noise spectrum to determine a noise  
4 classification for noise within the channel; and  
5 generating a filter select signal based upon said noise classification.

1 16. The method of claim 15, wherein:  
2 filtering said communication signal includes directing said communication  
3 signal to the input of one filter within a bank of filters based on said filter select signal.

1 17. The method of claim 13, wherein:  
2 selecting one of a plurality of filter responses includes choosing a filter response  
3 that will most effectively flatten noise within said communication signal.

1 18. The method of claim 13, comprising:  
2 applying said filtered communication signal to the input of an equalizer.

1 19. The method of claim 13, wherein:  
2 said plurality of filter responses includes at least one high pass filter response  
3 and at least one low pass filter response.

1 20. A computer readable medium having program instructions stored thereon for  
2 implementing a method for filtering a communication signal when executed within a  
3 digital processing device, said method comprising:  
4 analyzing a communication signal received from a wireless communication  
5 channel to determine a class of noise in the wireless communication channel;  
6 selecting one of a plurality of filter responses to filter said communication  
7 signal based on said class of noise; and  
8 filtering said communication signal using said selected filter response.

1 21. The computer readable medium of claim 20, wherein:  
2 analyzing a communication signal includes estimating a noise spectrum within  
3 said channel.

1 22. The computer readable medium of claim 21, wherein:  
2 analyzing a communication signal includes calculating filtered noise powers  
3 using said estimated noise spectrum.

1 23. The computer readable medium of claim 22, wherein:  
2 analyzing a communication signal includes comparing said filtered noise  
3 powers to one another.

1 24. The computer readable medium of claim 20, wherein:  
2 selecting one of a plurality of filter responses includes choosing a filter response  
3 that will most effectively flatten noise within said communication signal.